

older botanists sure to confuse them, as *loculicidal* and *septicidal* and the troop of words which end in *-tropous*; or they convey a morphologically impossible idea, as *inferior* and *superior* as applied to the ovary. To see how these faults can be avoided, let us inquire why an unusual amount of names are required at all.

(I.) Popular names being vaguely used require to be restricted in their meaning by accurate definition.

(II.) A new name is required for any part to which no name is popularly assigned, either because the thing to be named escapes popular observation, or because two or more things are included in the connotation of the popular term.

(III.) New adjectives, or adjectival-periphrases, are required to express characteristics, or relations of part to part.

Let me briefly suggest some principles, which, while remedying the faults of the old terminology, seem not to clash with these three necessities of the subject.

(a) Names for new things to be given in English, *ex. gr.*, the names *calyx* and *corolla* to be taught as *cup* and *crown*: in this we should be only following the German use of *Kelch* and *Krone*.

(b) Where a part of a thing already named requires a fresh name, the preference to be given to a name framed like the German double words—*Kelch-blatt*, *Staub-blatt*—so as to indicate the relation of part to part, thus *cup-leaf*, *leaf-stalk*, *flower-stalk* to be taught instead of *sepal*, *petiole*, and *peduncle*.

(c) Short expressions involving English (not Greek) prepositions to be used for adjectives: thus *splitting by mid-ribs*, *on seed-vessel*, *united by dust-pouches*, to be used for *loculicidal*, *epigynous*, *syngenesious*.

(d) Where the definitions of the terms is given in numbers, numbers or fractions be used instead of those terms: thus in *sestivation*, $\frac{2}{3}$ to be used for *quincuncial*; in cutting of leaves the fraction of the leaf cut to be stated instead of *omnia quæ excurrunt*, *in-fid.*, *-sect.*, and *-partite*.

But it will be said—how will pupils taught thus get on afterwards? The answer is, either they will do no more of the subject than they do at school, in which case they will have got the idea without the obstructions of the terms; or they will care to go on further with the subject, in which case they will learn the terms very quickly, being now familiar with the facts and ideas. In neither case will time have been lost, and the scope of botanical subjects which may be treated in the time will have been doubled.

I must apologise for the length to which this letter has run.

FRANK E. KITCHENER

Rugby, September 16

Hutton's Trigonometrical Tables, for Arcs expressed as portions of the Radius

AT the end of the preface of the first edition of Hutton's Mathematical Tables (1785) is the following postscript:—"P.S.—Since my History of Trigonometrical Tables in the following Introduction was printed, there has been published in the 'Philosophical Transactions' for the year 1784, a paper of mine concerning a project for the trigonometrical tables to be constructed on a new plan, namely, in which the arc of the quadrant is divided into aliquot parts of the radius, or according to the real lengths of the arcs, which construction is now in some degree of forwardness, as myself and several assistants have been closely engaged in the execution of it ever since." And in the succeeding editions, down to the sixth, 1822, there occurs on p. 2 of the Introduction the following remark:—"But the complete reformation would be to express all arcs by their real lengths, namely, in equal parts of the radius decimally divided, according to which method I have nearly completed a table of sines and tangents." Hutton died in 1823, and I can find no further reference to the table in question. I feel pretty certain that it has never been published, and there is no other paper on the same subject (except that in the *Phil. Trans.*, 1784) of Hutton's referred to in Watt's "Bibliotheca" or the Royal Society's Catalogue.

The table was intended to give the sines, tangents, &c., of $\frac{1}{10}, \frac{1}{100}, \frac{1}{1000}$, &c. (the unit being the arc equal to radius) to seven decimal places, and would be very useful. If it has not been published, perhaps some reader of NATURE might be able to say what has become of the manuscript that was nearly completed.

I may mention that the calculation of such a table was under the consideration of the Tables Committee of the British Asso-

ciation, but it was thought that some other tables were at present more urgently needed.

J. W. L. GLAISHER

Cambridge, Sept. 16

THE "HASSLER" EXPEDITION

WE are indebted to the courtesy of the Editor of the *New York Tribune* for early communication of the following information from Prof. Agassiz's expedition:—

OFF GUATEMALA, July 29, 1872

To Prof. Benjamin Peirce, Superintendent U.S. Coast Survey.

MY DEAR PEIRCE:—Do not be surprised at my few messages. It is about all I can do to take advantage of every opportunity that offers for study and collecting; but I rarely feel sufficiently collected to do any connected writing. I have another new chapter concerning glacial phenomena, gathered during our land journey from Talcahuano to Santiago, but it is so complicated a story that I do not feel equal now to recording the details in a connected statement, while the whole may be put in a few words.

There is a broad valley between the Andes and the coast range, the Valley of Chillan extending from the Gulf of Ancud, or Port Montt, to Santiago, and farther north. This valley is a continuation, upon somewhat higher level, of the channels which, from the Strait of Magellan to Chiloe, separate the islands from the main land, with the sole interruption of Tres Montes, which gives the clue to the whole, as we have here in miniature a valley between the Andes and the coast range. Now this great valley, extending for more than 25 degrees of latitude, is a continuous glacier bottom, showing plainly that for its whole length the great southern ice-sheet has been moving northwards in it. I could find nowhere any indication that glaciers descending from the Andes had crossed this valley and reached the shores of the Pacific. In a few localities only did I notice Andean, *i.e.*, volcanic erratics upon the loose materials filling the old glacier bottom. Between Currillo and Santiago, however, facing the gorge of Tenon, I saw two distinct lateral moraines, parallel to one another, chiefly composed of volcanic boulders, resting upon the old drift, and indicating by their position the course of a large glacier that once poured down from the Andes of Tenon, and crossed the main valley, without, however, extending beyond the eastern slope of the coast range. These moraines are so well marked that they are known throughout the country as the Cerillos of Tenon; but nobody suspects their glacial origin; even the geologists of Santiago assign a volcanic origin to them.

What is difficult to describe in this history are the successive retrograde steps of the great southern ice-field, that, step by step, left to the north of it larger or smaller tracks of the valley free of ice, so that large glacial lakes could be formed, and, in fact, seem always to have existed along the retreating edge of the great southern glacier. The natural consequence is that there are everywhere stratified terraces, without border barriers (as these were formerly the ice that has vanished), resting at successively higher or lower levels, as you move north or south, upon unstratified drift of older date, the northernmost end of these terraces being the oldest, while those farther south belong to the latter steps in the waning of the ice-fields. From these data I infer that my suggestion concerning the trend of the stræ upon the polished and glaciated surfaces of the vicinity of Talcahuano, alluded to in the postscript of my last letter, is probably correct.

I was much grieved on reaching Valparaiso to hear of the mishaps of the dredging apparatus. The subsequent departure of Pourtales has been a great loss to us all, for notwithstanding his silent nature, he is a powerful standby.

Our visit to the Galapagos has been full of geological

and zoological interest. It is exceedingly impressive to see an extensive archipelago, of most recent origin, inhabited by creatures so different from any known in other parts of the world. Here we have a positive limit to the length of time that may be granted for the transformation of these animals, if they are in any way derived from others dwelling in different parts of the world. The Galapagos are so recent that some of these islands are barely covered with the most scanty vegetation, itself peculiar to these islands; some parts of their surface are entirely bare, and a great many of the craters and lava streams are so fresh that the atmospheric agents have not yet made an impression upon them. Their agent does not, therefore, go back to earlier geological periods; they belong to our time, geologically speaking. Whence then do their inhabitants come from—animals as well as plants? If descended from some other type, belonging to some neighbouring land, then it does not require such unspeakably long periods for the transformation of species as the modern advocates of transmutation claim; and the mystery of change, with such marked and characteristic differences between existing species, is only increased and brought to a level with that of creation. If they are autochthones, from what germs did they start into existence? I think that careful observers, in view of these facts, will have to acknowledge that our science is not yet ripe for a fair discussion of the origin of organised beings.

Our stay in Panama has allowed us to make very extensive collections in the Bay and across the Isthmus. I was surprised to find so little difference in the character of the flora and of the terrestrial fauna between the two oceans. Marked peculiarities are only to be found among the marine animals, and even among them the American character of the Atlantic and Pacific marine fauna is unmistakable; we are not surrounded by animals recalling by their peculiarities the many groups of islands of the Pacific. I expect that our visit in Acapulco will confirm these impressions.

L. AGASSIZ

CAPTAIN HALL'S ARCTIC EXPEDITION

THE *Washington Chronicle* of August 26 contains the following interesting account of the progress and position of this important expedition:—"The Navy Department has received later despatches from Captain Hall, by the way of Tydskland and Copenhagen, completing his official record up to the moment of final departure from North Greenland. These despatches, which are quite full, bear date off Tossak, Tussuissuk, N. lat. 73° 21', W. long. 56° 5', August 24, 1871, and are, therefore, only four days later than Hall's Upper Navik despatch, August 20, 1871, which reached the department within three months by the way of Copenhagen. The explanation of this long delay *in transitu* is that there is no regular communication between Denmark and these far-off colonies but once a year. Hall's Upper Navik despatches were timed to reach the Danish brig just then sailing, and this present letter sent back by native pilots, as he notes in concluding, may have had near a year's detention in Disco. It seems to have reached the American Minister at Copenhagen about July 30. Although thus divested of any special value as news, the present despatch is of much intrinsic interest. All on board the *Polaris*, officers, scientific corps, and men, were well and in excellent spirits. The seagoing qualities of the vessel had been tested and found admirable; the engines and machinery were in perfect working order, coal and rosin in good supply, and the ship's crew abundantly provisioned. For the long Arctic night before them they had books, games, instrumental music, &c.—in a word, everything that the thoughtful care of the department could supply, or letters of credit at Newfoundland and in Greenland furnish, had been laid in to complete their outfit, and of all this Captain Hall

makes characteristic and thankful acknowledgments. Governor Elberg, of the Navik district, had accompanied the *Polaris* as far as Tossak, the extremest northerly limits of Danish jurisdiction as well as of civilised life, and was to the last moment assiduous in his exertions to further the interests of the expedition. Mainly through his co-operation Hall was fortunate enough at Tossak to make up his complement of Esquimaux dogs—sixty strong, healthy animals—a matter of almost vital importance. He likewise laid in a large supply of dog food, and considerably augmented his stock of reindeer-furs, sealskins, &c., for the adventurous voyage. At Upper Navik the expedition had shipped Hans Christian, a famous native hunter and dog-driver, with his wife and three children. Jensen, the Dane, who was under promise to join the expedition at Tossak, backed out at the last moment. Governor Elberg, of whose many kindnesses Hall speaks with full heart, awaited at Tossak the return of the native pilots, bearing this despatch to him, and it closes with the prow of the *Polaris* northward in the early morning of August 24, with a complete roster of all on board, thirty-three souls, and a fervent, hopeful prayer for success. It will be remembered that Captain Hall's previous despatches speak of his good fortune in meeting at Holsteinburg the returning Swedish expedition, and that the commander, Baron van Otter, kindly furnished him copies of log, deep-sea soundings, &c., assuring him that the season was more than usually favourable, and extremely wide iceberg-channels, &c. Of the same purport was the information received of Governor Rodolph, thirty years resident in North Greenland, who declared the year to be more favourable for any northern voyage than many years ago or to come. Acting on this information, and under discretionary power vested in him by the Navy Department, Captain Hall had abandoned the Jones's Sound route, and had decided before he left Upper Navik that after stopping at Tossak he would cross Meville Bay to Cape Dudley Digges, and from that point steam direct to Smith's Sound, thence make all possible attempts to find a passage on the west side of the Sound from Cape Isabella up to Kennedy Channels, wintering there probably in about the same latitude or a little higher than Kane's winter quarters, and thence on and up to the North Pole. The letter published in the *New York Times*, April 25, purporting to narrate a disaster to the *Polaris* and her return last February to Disco, was a *canard*. Not one word of it has ever been credited at the Navy Department. It is not believed that any disaster has overtaken the Expedition, or that any ground for apprehension exists."

THE BLIND FISHES OF THE MAMMOTH CAVE AND THEIR ALLIES*

THE *Amblyopsis spelans* undoubtedly has quite an extensive distribution, probably existing in all the subterranean rivers that flow through the great limestone region underlying the Carboniferous rocks in the central portion of the United States. Prof. Cope obtained specimens from the Wyandotte Cave and from wells in its vicinity, and in the Museum of Comparative Zoology at Cambridge there is a specimen labelled "from a well near Lost River, Orange Co., Ind.," which, with those from the Wyandotte Cave, is conclusive evidence of its being found on the northern side of the Ohio† as well as on the southern, in the rivers of the Mammoth Cave. I have been able to examine a number of specimens from the Mammoth Cave, and have carefully compared with them the one from the well in Orange Co., Ind., and find that the specific characters are remarkably constant.

* Reprinted from the *American Naturalist*, a sequel to "The Blind Crustacea of the Mammoth Cave." See *NATURE*, vol. v. pp. 445, 484.

† I have also been informed by Mr. Holmes of Lansing, Mich., that blind fishes have been drawn out of wells in Michigan.